

sign any and all certificates or papers and such reports shall be accepted by the proper officers or departments, and shall have equal rights within the scope of this Act, with other physicians in any and all institutions supported wholly or in part by public funds and shall have all the rights and privileges accorded to physicians and/or surgeons as set forth in the "Workmen's Compensation Insurance and Safety Act" of 1913, and the "Workmen's Compensation Insurance and Safety Act of 1917" with subsequent amendments and other laws supplementary to the compensation and safety provisions, and shall have the right to report and certify births and deaths.

Sec. 64. Naturopathic physicians licensed under this Act may use the following terms of designation: "Doctor of Naturopathy," or its abbreviation, "N. D.," or "Naturopath," "Naturopathic Physician," or any term or abbreviation thereof relating to naturopathy or any of the branches thereof. . . .

Sec. 67. Nothing in this Act shall be construed to interfere with the rights, powers, and duties of persons licensed under the Osteopathic Act, the Optometry Law, and the act entitled, "An Act prescribing the terms upon which licenses may be issued to practitioners of chiropractic, creating the State Board of Chiropractic Examiners and declaring its powers and duties, prescribing penalties for the violation hereof, and repealing all acts and parts of acts inconsistent herewith," approved November 7, 1933.

Sec. 68. Subject to the provisions of Section 67 neither the State Board of Medical Examiners nor any other board or agency of the State shall grant any license to practice naturopathy or drugless healing or any drugless practitioner's certificate. . . .

Sec. 72. If any section, subsection, sentence, clause or phrase of this Act is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this Act. The people hereby declare that they would have passed this Act, and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases may be declared unconstitutional. . . .

OBSERVATIONS ON THE EPIDEMIC OF POLIO-ENCEPHALITIS IN LOS ANGELES, 1934*

E. C. Rosenow, M. D., Division of Experimental Bacteriology; F. R. Heilman, M. D., Fellow in Surgery; The Mayo Foundation; and C. H. Pettet, M. D., Los Angeles County General Hospital: A preliminary study made in Rochester of the nasopharyngeal swabbings of patients suffering from poliomyelitis, nasopharyngeal swabbings of well persons, and other material suspected to contain the causative agent of poliomyelitis (kindly sent us from Los Angeles by Dr. Hugh T. Jones), made a further study of the epidemic by our methods extremely desirable. Green-producing, often extremely pleomorphic streptococci having characteristic neurotropic cataphoretic velocity, peculiar localizing and symptom-producing power on suitable injection of animals, and specific serologic properties, were isolated from most of the swabbings and from each of the other materials received.

Precipitin reactions between the cleared sodium chlorid solution extracts of nasopharyngeal swabbings and the encephalitis and poliomyelitis antistreptococcus serums were carried out. These were positive with about 75 per cent of the specimens of material from patients and with about 75 per cent of that from normal persons living within the epidemic zone. In contrast, only 8 per cent of well persons, swabbed as controls in Rochester, gave positive results. The streptococci were agglutinated, often in high dilution, by these serums. The antisera neutralized the toxins contained within the heat-killed streptococci

as measured by skin tests on susceptible persons. It appeared certain that these strains of streptococci must have etiologic significance, and that they belonged in a group between those isolated by one of us during studies of typical epidemics of poliomyelitis^{1,2,3} and those isolated during a study of the epidemic of peculiar encephalitis in St. Louis.^{4,5} Our study in Los Angeles was made possible through the kind intervention of Dr. Clarence G. Toland, president of the California State Medical Association, the offer of facilities at the Los Angeles County General Hospital by Dr. P. Berman, medical director, and the financial support of The Mayo Foundation.

EPIDEMIOLOGY

Through the kind cooperation of Dr. J. L. Pomeroy, Health Officer of Los Angeles County, and of Dr. George Parrish, Health Officer of the city of Los Angeles, we learned soon after our arrival on June 26, 1934, (1) that the outbreak occurred rather suddenly during unusually early, hot weather in May; (2) that the peak had passed; (3) that the disease was not diffusely distributed throughout the county and city, but that it was extremely high in some places, especially in the city of Belvedere and on Bunker Hill and County Hospital areas in Los Angeles and low in other areas such as Beverly Hills, Hollywood, and the harbor district; (4) that the disease remained fairly well localized to Los Angeles County; (5) that there was an unusually high incidence of multiple cases in family and other groups, often occurring almost simultaneously; (6) that there were relatively more cases among the middle class than among the poor, especially among those residing in the city; and (7) that the mortality rate and incidence of paralysis fortunately was very low.

The usual precautions calculated to minimize the spread of the disease had been taken. Patients, as soon as the diagnosis was made, were taken to the General Hospital or were quarantined. About 80 per cent of the milk supply of Los Angeles County and city was pasteurized. Bacteriologic tests of the water supply by standard methods were made in large numbers by the water and health departments, and whenever indicated by the abnormally high colon bacillus count the water was chlorinated. We were especially impressed by the unusually large number of cases that occurred without a history of contact, by the high incidence of cases in the upper stories of apartments or nurses cottages, on high levels or hills, and on the high sides of streets along hillsides.

CLINICAL OBSERVATIONS

The disease picture was very different from that found during the usual epidemics of acute anterior poliomyelitis or infantile paralysis (Heine-Medin disease). It attacked mainly older children and young adults (one-third of the patients were from eighteen to thirty years of age) instead of infants and children less than five years of age. Weakness of muscles was common, but marked flaccid paralysis was extremely rare. An outbreak of gastro-enteritis, followed often by symptoms of mild encephalitis, occurred prior to the epidemic. The disease at the onset consisted of an acute, usually relatively mild, infection of the upper part of the respiratory tract, followed by, or associated with, symptoms suggesting involvement, in varying degrees in different cases, of, respectively, the anterior and posterior horns, the brain, the dura especially

1 Rosenow, E. C.: An Institutional Outbreak of Poliomyelitis Apparently Due to a Streptococcus in Milk, *Jour. Infect. Dis.*, 50:377-425 (May-June), 1932.

2 Rosenow, E. C., Rozendaal, H. M., and Thorsness, E. T.: Acute Poliomyelitis—Studies of Streptococci Isolated from Throats and Raw Milk in Relation to One Epidemic, *Jour. Ped.*, 2:568-593 (May), 1933.

3 Rosenow, E. C., Towne, E. E., and Wheeler, G. W.: The Etiology of Epidemic Poliomyelitis—Preliminary Note, *J. A. M. A.*, 67:1202-1205 (Oct. 21), 1916.

4 Rosenow, E. C.: The Relation of Streptococci to the Epidemic of Encephalitis in St. Louis—Preliminary Report, *Proc. Staff Meetings of The Mayo Clinic*, 8:559-563 (Sept. 13), 1933.

5 Rosenow, E. C.: Isolation of Streptococci in a Study of the Epidemic of Encephalitis in St. Louis, *Proc. Soc. Exper. Biol. and Med.*, 31:285-286 (Nov.), 1933.

* Presented at Mayo Foundation staff meeting July 18, 1934. Excerpts from a reprint of the Mayo Foundation for Medical Education and Research.

surrounding the roots of the sensory and motor nerves (radiculitis), and the muscles, especially of the back. The systemic manifestations were essentially those of neuropolioencephalitis with or without myositis. The incidence of abortive attacks in relation to frank cases was extremely high, estimated variously at from 10:1 to 50:1. Infection of the upper and lower parts of the respiratory tract manifested by symptoms and findings of a cold or sore throat, bronchitis, bronchopneumonia, or pleuritis; involvement of the nervous system some days after an initial attack of fever, and recurrence of fever and other symptoms during convalescence, were far more common than obtains in typical epidemic poliomyelitis. The onset was generally abrupt, often with symptoms of gastro-enteritis. Malaise, headache often frontal and severe, with or without vertigo, low lumbar backache, vomiting sometimes projectile, usually with marked diarrhea sometimes suggestive of ulcerative colitis, mild fever followed soon by a normal or subnormal temperature in mild cases, pain in muscles, muscular twitching, tingling sensations in the extremities, or actual muscular weakness, were common initial symptoms. In abortive cases recovery from initial symptoms without evidence of involvement of the nervous system usually ensued. In frank cases there was rigidity of the neck and spine, and pain often severe along the spine and in the muscles of the neck and back, associated with painful spasm of the muscles of the back and lower extremities and sometimes spasms of the diaphragm and abdominal muscles (hiccough); a feeling of great exhaustion and general weakness soon followed. The following were common and often persistent manifestations: inability to void urine early in the attack, due to spasm of the urinary bladder and sphincter, later transient incontinence of urine; distention and girdle-like pains in the abdomen, with vomiting, often resembling paralytic ileus and sometimes resembling attacks of appendicitis, or pain in the region of the heart, extending down one or both arms, sometimes resembling attacks of angina pectoris; increased tonus, rigidity or spasm of the muscles of involved extremities, and pain, often severe, on movement of muscles. The tenderness of muscles and cutaneous hyperesthesia frequently lasted from three to five weeks and often required morphin for relief. Photophobia, pain behind the eyeballs, congestion of the conjunctivae and blurred vision and diplopia, often transient, were common during the early stages of the disease. Lethargy, ptosis of eyelids and disorientation of mind were extremely rare. Paresthesia, due to involvement of nerve roots or posterior horns, fibrillary twitchings, early atrophy of muscles, lesions of the skin resembling toxic erythematous nodes, facial palsy, paresis, often transient, of the muscles of the pharynx and extremities, occurred in varying degrees of severity. Recovery from weakness following early application of orthopedic measures was unusually marked and often complete. There were extreme variations in type of disease, from mild transient weakness, often associated with great pain, to an occasional rapidly fatal, usual primary case of bulbar paralysis. The deep reflexes were nearly always hyperactive, often extremely so, in the early stages and nearly always mildly so, or normal, even in cases in which there was complete inability to move one or more extremities. Diminution, or loss of reflexes, so helpful in the diagnosis of typical poliomyelitis, was of little or no diagnostic aid in this epidemic. The cell count and other features of the spinal fluid were of little diagnostic or prognostic importance in this epidemic. There was no cellular increase in more than half of the cases, which is in sharp contrast to the great value of findings on the spinal fluid during typical epidemics of anterior poliomyelitis. In studies of many cases, in different epidemics of poliomyelitis, made by one of us,^{6,7} a spinal fluid free from cells

in a suspected case, even as early as eight hours after onset of symptoms, has, with only few exceptions, been correctly interpreted as proof that anatomic poliomyelitis was absent, and that paralysis would not occur. In the few exceptions, slight paralysis developed, which seemingly was arrested by the immediate administration of the poliomyelitis antistreptococcus serum. The chief value derived from spinal punctures in this epidemic was the relief of headache, due, in part, to increased pressure, often irrespective of whether fluid did or did not contain cells.

BACTERIOLOGIC FINDINGS

The bacteriologic results obtained in Rochester were repeated and greatly extended in Los Angeles. Green-producing, often extremely pleomorphic, streptococci having characteristic neurotropic cataphoretic velocity, and peculiar virulence were isolated almost constantly from nasopharyngeal swabbings of persons in the acute stage of the disease, often in later stages of the disease; commonly organisms of this type were isolated from well persons residing within the epidemic zone. They were isolated in pure cultures from the blood in three of five cases, from the urine in seven of ten cases, and from the stools in five or seven cases. Streptococci or diplococci, often extremely pleomorphic, were found in stained films of the highly concentrated sediment of the spinal fluid drawn early in the disease, in nineteen (82 per cent) of twenty-three cases in which the cell count was five or more, and in twenty-five (45 per cent) of fifty-four cases in which the cell count was less than one. Cultures, chiefly in freshly prepared dextrose-brain broth and incubated spinal fluids, after a small amount of dextrose-brain broth had been added, yielded the streptococcus in twenty-six (60 per cent) of forty-three cases in which the spinal puncture was made early in the attack. It was never isolated from cultures of cell-free fluids in negative or late cases. In one case, in the acute stage of the disease the streptococcus was isolated simultaneously from the nasopharynx, blood, spinal fluid and urine, and the several strains isolated produced typical symptoms and lesions in animals. It was isolated in pure culture on four occasions from the emulsion of the glycerolated brain and spinal cord of two patients who died of acute bulbar poliomyelitis, and once from the Berkefeld V-filtrates of these emulsions. Streptococci similar in virulence and other properties were isolated with great regularity from the materials suspected to contain the causative agent.

Through the kindness of Dr. N. G. Evans we obtained postmortem material from two patients who died of symptoms of acute bulbar poliomyelitis. Examination was made within a few hours after death. Microscopic examination of sections of brain and cord revealed strikingly marked congestion of the capillaries of the brain and patchy areas of cellular infiltration. In addition to the typical infiltration and other lesions of the anterior horns, far greater involvement was found of the posterior horns than is usual in similar cases in which patients succumb during epidemics of typical poliomyelitis. Sections stained by a modification of the Gram method, and in which only partial decolorization with alcohol was carried out, revealed unmistakable pleomorphic diplococci and other forms identical to those found in the sediment of the spinal fluid and in cultures from various sources.

Some of the strains isolated from the nasopharynx, blood, spinal fluid, urine and spinal cord, and most of the strains isolated from sources other than persons, were heat-resistant, remaining viable and of unabated specific virulence after heating in milk at 63 degrees centigrade for thirty minutes. Fortunately, nearly all strains were killed after heating in milk to 70 to 75 degrees centigrade for thirty minutes. On the basis of this heat-resistance we tried heating to 63 degrees centigrade for thirty minutes badly contaminated material, such as feces and sewage, and succeeded in isolating the streptococcus before it had lost its specific properties and virulence as would likely have occurred if the usual plating methods had been employed. . . .

⁶ Rosenow, E. C.: Streptococci in the Spinal Fluid in Acute Epidemic Poliomyelitis—Preliminary Report, *J. A. M. A.*, 91:1594-1595 (Nov. 24), 1928.

⁷ Rosenow, E. C., and Nickel, A. C.: Treatment of Acute Poliomyelitis with Poliomyelitis Antistreptococcus Serum. Results from 1921 to 1925. *Am. Jour. Dis. Child.*, 33:27-49 (Jan.), 1927.